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1 Introduction and summary

Brazil's public debt is large and interest payments weigh dangerously on the government's budget. In 2001 interest expenditure amounted to 7,3 per cent of GDP. On a mark-to-market basis (that is considering the effect of exchange rate depreciation on the value of foreign currency-denominated bonds) interest expenditure reached 9 per cent of GDP. These figures are large, though not unusual in high debt countries: they are comparable to those observed in some European countries (Italy, Greece and Belgium) prior to monetray union. Two factors contribute to this level of debt service: the size of the debt and the average cost of the debt.

How large is Brazil's public debt obviously depends on the definition of debt which is adopted, that is whether one considers the gross or the net debt of the public sector. The difference is significant since the federal government owns a large number of assets–some liquid, such as bank deposits, some more doubtful, such as the claims on the states. There is also a question mark concerning hidden liabilities: even after extended recognition of previously unconsolidated liabilities, JPMorgan's Drausio Giacomelli (2002) still puts them at 10 per cent of gdp. In May 2002 the net debt of the consolidated public sector (*Dìvida liquida do setor pùblico consolidado, Banco Central do*

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Brasil, Nota Para a Imprensa, Table XLVI) was 56 per cent of GDP; the gross debt almost 76 per cent.

Perhaps even more important than the level of the debt, is its rate of growth: in the first five months of 2002 the net debt, as a per cent of gdp, increased by almost 3 points: from 53,3 to 56 per cent–and this without marking to market the dollar-denominated bonds whose value increased as a result of the exchange rate depreciation. In 2001 the primary budget surplus was 3,7 per cent of gdp; the level that would have been required to keep the debt-gdp ratio stable was almost twice as large: 7.2 per cent. Of course all depends on the cost of debt service. If in 2001 interest payments had been 5.3 per cent of gdp, instead of 9 per cent, a 3,5 per cent primary surplus would have been enough to keep the debt stable. Understanding why Brazil's interest rates are "so high" is the objective of this paper.

We start, in Figure 1, documenting the term structure of Brazilian interest rates. This extends up to two years, the maximum maturity of interest rate swaps. During 2001 the term structure was sharply upward sloping: the yield on assets with a 2-year maturity (2-year fixed interest rate swaps) was 10 points above the Selic rate. In the first months of 2002 the structure had flattened significantly, in part because the Selic rate had increased from fifteen per cent to nineteen per cent. Since April, however the term structure is once again upward sloping.

At the long end of the term structure there are only US dollar denominated Brady bonds: Figure 2 compares the yield on 10-year US Treasuries with the yield spreads, over Treasuries, of 10-year Brady bonds issued by Brazil and Mexico. In early 2002 Brazilian spreads had significantly fallen from the peak reached in August 2001, returning to the level prevailing in December 2000, although their level remained 600 basis points above Mexican spreads. During April the spread has returned to a level very close to 1000 basis points.

What these data show is that even before the most recent turnaround in expectations, interest rates, and interest rate spreads, were exceptionally high. This is particularly true considering the evolution of inflation expectations. The top panel of Figure 3 shows the results of the daily survey conducted by the Banco Central do Brazil: one-year ahead inflation expectations stand now at about 4.9 per cent. Thus the ex-ante one-year real rate is 15.5 per cent.

Two factors contribute to the level of Brazilian interest rates. (i) monetary policy, and the way it affects and reacts to inflation and exchange rate

expectations; (ii) term premia. In this paper we study the relative importance of these factors starting from the analysis of the way the central bank sets the Selic rate. We find that the behavior of the central bank is best described by a model linking the Selic rate to 1-year ahead inflation expectations. By simulating forward this reaction function, jointly with a model for inflation expectations, we are able to construct the path of future Selic rates. Once future Selic rates are known, we build theoretical long-term interest rates, at all maturities, as the (appropriate) average of future expected Selic rates. These theoretical rates are, by construction, free of term premia. Therefore the spread between market rates at different maturities and our theoretical rates provides a measure of the term structure of term premia. The final step consists in building, from the term structure of term premia, the term structure of forward risk premia. This allows us to evaluate the market assessment of term premia at a 6-months horizon, now, 6-months from now, 12-months from now and 18-months from now. This complements, at short horizon, the information that could be extracted from the term structure of Brady bonds at a 10-year horizon (since Brady bonds close to expiration are typically illiquid.)

Our main conclusions can be summarized as follows:

- The answer to the question why are Brazil's interest rates so high should distinguish between the level of policy rates (the Selic rate) and interest rates at longer maturities, starting from 3-months swap rates. Since the devaluation of January 1999, Selic rates have always been set consistently with a monetary policy rule that targets expected inflation. Such rule has been effective at reducing inflation expectations in 1999 and 2000; after the turnaround in expectations following the depreciation of 2001, the rule has again been able to curb inflation expectations in the second part of the year (see Figure 3). The equilibrium rate implied by such a rule stands currently at about 17.6 per cent. Interest rates at longer maturities behave very differently from policy rates. We argue that such difference does not reflect expectations of future monetary policy but it is rather determined by the term premia. In other words, swap rates are high not because the markets expect an increase in policy rates but because swaps are perceived as risky. As mentioned above we measure such risk, that is term premia, by the distance between the observed swap rates at maturities up to two years and theoretical rates for the same maturities based exclusively on future projected policy

rates. We find that future expected monetary policy plays a very small role in explaining fluctuations of interest rates at longer maturities. Take, for instance, the surge in interest rates occurred at the end of April 2002: the Selic rate has remained flat at 18.5 per cent, while the interest rate on 24-months swaps has risen to 23.9 per cent; our theoretical 24-month interest rate, which only reflects expectations on future monetary policy, stands at 18.79. We therefore conclude that the 540 basis point spread between the 24-month interest rate and the monetary policy rate is almost entirely explained by a term premium of 511 basis points. Such term premia are strongly correlated with Brady bonds spreads,which are not (at least directly) affected by devaluation expectations. We conclude that macroeconomic fundamentals and debt dynamics are the main determinants of the term spread of Brazilian rates.

- During April and early May 2002 the yield curve has once again steepened and one-year ahead inflation expectations have moved up only very slightly form 4.5 to 4.9 per cent. This is the result of an increase in term premia not accompanied by significant shifts in the path of future inflation expectations and thus of future policy rates. The bottom panel of Figure 3 shows projections for future inflation expectations and future SELIC rates built using the model constructed in this paper. For both variables there is very little difference between the projections as of mid-February and those as of mid-May 2002. The current level of the short rate, though still exceptionally high, is slightly below the level necessary to stabilize inflation expectations according to our Taylor-type rule. In fact, based on our simulations, one could argue that recent monetary policy has been slightly on the loose side [1]. The Selic rate implied by the Taylor rule when expected inflation is 140 basis points higher than the target, as in May 2002, moves gradually towards a level of 19.6 per cent.

- The central bank's good performance, however, is taking place in an institutional vacuum. The bank has been extremely successful in intro-

[1] In February 2002 the central bank revised its inflation target, moving from a point inflation target to a band. If one were to allow for the bank to target the upper side of the band, rather than its middle range, the policy rates observed from February unwards would no longer to "too low".

ducing and operating an inflation targeting regime: it is mostly thanks to this monetary policy regime that following a 60 per cent devaluation IPCA inflation has remained essentially stable (2.7 per cent on average in 1998, the year before the devaluation, 4.9 in 1999, 7 in 2000 and 6.8 in 2001) and inflation expectations have stabilized. The Banco Central do Brasil, however, enjoys none of the institutional guarantees that protect the independence of other central banks and shield them from the risks of political pressure. We know of no central bank that successfully operates an inflation targeting regime and is not formally independent. Such lack of institutional safeguards could be a factor explaining the high level of policy rates needed to stabilize inflation to the target. Getting through Congress, before the elections, the constitutional amendment required to pass the new central bank law would be a welcome parting gift of President Cardoso.

- The term structure of forward premia (term premia at a 6-months horizon, now, 6-months from now, 12-months from now and 18-months from now) as measured in mid-May 2002 does not reveal any shift in expectations up to Spring 2003. The 6-month risk premium for the period May to October 2002 is slightly below 500 basis points, almost identical to the 6-months risk premium for the period November 2002-April 2003. The 6-months ahead risk premium rises to about 700 basis points for the period May-October 2003, to reach 1200 basis points for the period November 2003-May 2004. The increase in the six-month ahead term premia occurring around the Spring of 2003 roughly corresponds to the coming in office of the new government after the election in October 2002. The upward shift in the term structure of forward risk occurred between February 2002 and May 2002 could thus be linked to electoral uncertainty. However, even during the honeymoon of mid-February, when the yield curve had flattened and term premia were at the lowest level in the last three years, the Brady bonds spread for Brazil was some 400 points above that of Mexico. Thus, independently from short-term fluctuations related to the coming elections, the level of the Brazilian term premia reveals markets' concerns about the sustainability of the debt.

- Many in Brazil argue that the country is just in a bad equilibrium: a reduction in the Selic rate and a fall in interest rate spreads would

be enough to make the debt sustainable at the current level of primary surplus. This is true by definition, but the experience of other countries which have successfully made the transition to a "good" equilibrium, suggests that one should not rely on such a transition happening automatically: Brazil may have to raise its primary surplus further, at least for some time, before the transition to a good equilibrium will allow the government to relax fiscal policy. A temporary increase in the primary surplus should be seen as an investment: the returns will justify the temporary sacrifice with a vengeance;

- Debt management could contribute in two ways to reducing the burden of the debt: (i) lengthening the maturity and the duration of the debt would free debt service from short run monetary policy, reduce the risk of a funding crisis and thus contribute to lowering country risk. This is now difficult, since the market is not prepared to buy R$-denominated instruments at maturities longer than a year. Emerging markets borrowers have recently used innovative financial instruments to lengthen the maturity of the debt. One example, which we discuss in this paper, are bonds containing a (European) put option; (ii) through privatizations, asset securitization and equity return swaps: by allowing a higher diversification of investors' portfolios, these instruments would also contribute to reducing the cost of debt service.

2 Measuring term premia

To measure to what extent the yield on government bonds is affected by the country's risk premium, one needs to compare these bonds with a risk-free asset denominated in the same currency and with the same liquidity conditions. Brady Bonds are the usual benchmark for Latin American countries: the spread between the yield on US dollar denominated long-term government bonds issued by a country, and the yield on US government bonds with the same duration is generally taken as the measure of term premia.

A potential problem with Brady bond spreads is that Brady bonds are usually long-term bonds, and their liquidity is often low as they approach maturity. They are thus ill-suited to ask what the term premia is at shorter horizons. Liquid securities at relatively short horizon are typically issued in locally currency: the spreads between the yield on these securities and the

corresponding US-issued securities thus include exchange rate devaluation expectations as well as term premia. As is well known, the identification of these two components is a difficult exercise (see Garcia and Didier, 2001). In the case of Brasil a liquid market has recently developed for interest rate swaps at the 6-month, 12-month, 18-month and 24-month frequencies. We propose a framework to identify term premia from these data.

Our framework applies to countries, as Brazil, for which the conduct of monetary policy is successfully described by a Taylor-type rule. In such situation the stream of expected policy rates can be derived by simulating forward a joint model for policy rates and their determinants. The average of future expected policy rates will deliver a theoretical long-term rate. This is the long term rate that would be observed if expectations were formed using the model on which the simulations are based, and in absence of a risk premium. Under the null that agents form expectations using our simulated model, the difference between the fixed interest rates on swaps and our theoretical rates, at corresponding durations, is a proxy for term premia at different maturity.

To understand this procedure consider the following monetary policy rule

$$y_{t,t+1} = \rho y_{t-1,t} + (1-\rho)\left(\beta_o + \beta_1\left(\pi^e_{t,t+12} - \pi^*_t\right)\right) + u_{1t} \tag{1}$$

where $y_{t,t+1}$ is the Selic rate, π^e_{t+12} the one-year ahead expected inflation, and π^*_t is the inflation target of the Banco Central do Brasil. The above rule can be rationalized in the framework of strict inflation targeting and it is successful in describing the behavior of Selic rates from 1999 onwards. If inflation expectations can be directly observed, and the inflation target can be considered as exogenous, then a completed model for inflation expectations and the policy rates can be specified by adding to (1)an equation for inflation expectations. A possible simple specification is

$$\pi^e_{t,t+12} = \gamma_0 + \gamma_1 \pi^e_{t-1,t+11} + \gamma_2 y_{t-1,t} + \gamma_3 \pi^*_t + u_{2t} \tag{2}$$

which can be thought as a general dynamic specification for expected inflation, which allows expectations to adjust toward the target and to react to deviation of policy rates from their long-run equilibrium values. Joint dynamic simulation of the system composed by (1) and (2) allows to generate the future path of policy rates at any horizon. With this information we can construct theoretical long-term interest rates at any maturity, which only

reflect only expectations for future monetary policy–i.e. they are free form term premia by construction. We define

$$y^*_{t,T} \equiv \frac{1}{T-t}\sum_{j=1}^{T} y^F_{t+j-1,t+j} \tag{3}$$

where $y^F_{t+j-1,t+j}$ are model based simulations of future policy rates and $y^*_{t,T}$ are our theoretical long-term ($T-t$ periods) interest rates.

To close our model we consider long-term assets such as fixed interest on swaps at 6-month, 12-month ,18-month and 24-month horizons. Define the term premium per period as the difference between one-period expected return of a multi-period bond and the one-period return on the safe asset[2]:

$$RP_{t,T} = E_t\left(p_{t+1,T} - p_{t,T}\right) - y_{t,t+1} \tag{4}$$

where $p_{t,T}$ is the (log of) price at time t of a bond (swaps can be considered as bonds fluctuating at par) with maturity at T , $y_{t,t+1}$ is the one-period return, i.e. the policy rate, assumed to be risk-free, $RP_{t,T}$ is the time varying term premium for a bond with maturity T. As the relation between $p_{t,T}$ and the continuously compounded yield to maturity on a bond with maturity T, $y_{t,T}$, is

$$p_{t,T} = -\left(T-t\right) y_{t,T}, \tag{5}$$

we have

$$y_{t,T} - \left(T-t-1\right) E_t\left(y_{t+1,T} - y_{t,T}\right) = y_{t,t+1} + RP_{t,T}. \tag{6}$$

By recursive substitution, we can write

$$y_{t,T} = \frac{1}{T-t}\sum_{j=1}^{T} E_t y_{t+j-1,t+j} + L_{t,T} \tag{7}$$

$$L_{t,T} = \frac{1}{T-t}\sum_{j=1}^{T-1} RP_{t+j-1,t+T}. \tag{8}$$

[2]We consider zero-coupon bonds for the sake of exposition, but the reasoning can be extended to bonds paying coupon

where $L_{t,T}$ is the $(T-t)$ period term premium.

Combining (7) and (3) we have

$$y_{t,T} = y^*_{t,T} + \frac{1}{T-t}\sum_{j=1}^{T}\left(E_t y_{t+j-1,t+j} - y^F_{t+j-1,t+j}\right) + L_{t,T} \tag{9}$$

Equation (9) makes clear that deviations of $y_{t,T}$ from $y^*_{t,T}$ can be explained by two factors: term premia and differences between model based forecasts and agents' expectations of future Selic rates. Under the null that agents expectations do not differ from model based expectations we can derive a direct measure of term premia at any duration as the difference between $y_{t,T}$ and $y^*_{t,T}$.

We derive $L_{t,t+6}, L_{t,t+12}, L_{t,t+18}, L_{t,t+24}$ using, along with $y^*_{t,T}$, observations on fixed interest rate on swaps for the 6-month, 12-month , 18-month and 24-month maturities. These are measures of term premia at much shorter maturities than those based on Brady Bonds.

Finally, from these measures of country premia at four different maturities we can build forward risk premia by applying the logic of the construction of forward rates. Implied forward rates can be calculated from spot rates a forward rate at time t with trade date $t+t'$ and settlement date $t+T$ can be calculated as the return on an investment strategy based on buying, at time t, a zero-coupon bond maturing at time $t+T$, and selling, always at time t, a zero-coupon bond maturing at time $t+t'$. The forward rate is thus related to the spot rate by the following formula

$$f_{t+T,t+t',t} = \frac{Tr_{T,t} - t'r_{t',t}}{T-t'} \tag{10}$$

For instance, the forward rate for a 1-year investment with settlement in 2 years and maturity in 3 years is equal to three times the 3 year spot rate minus twice the two year spot rate.

By analogy we can construct forward risk premia as follows

$$Lf_{t+T,t+t',t} = \frac{TL_{T,t} - t'L_{t',t}}{T-t'} \tag{11}$$

Application of the above formula allows us to build measures of term premia at maturities up to 18 months, for any time in the future.

2.1 Results

We start from our estimate of the Taylor rule. The equation is estimated on monthly data over the period covering the inflation targeting regime, that is from February 1999 to March 2002. Consistently with the announced inflation targeting regime, we relate policy rates, the Selic rate, to deviations of inflation expectations, $\pi^e_{t,t+12}$ (daily survey on one-year ahead IPCA inflation) from the announced Banco Central do Brazil target, π^*_t, allowing for interest rate smoothing

$$y_{t,t+1} = \underset{0.07}{0.79} y_{t-1,t} + (1 - 0.79)\left(\underset{0.43}{17.16} + \underset{0.56}{1.78}\left(\pi^e_{t,t+12} - \pi^*_t\right)\right) + u_{1t} \qquad (12)$$

To illustrate how this rule performs, we report in Figure 4 dynamically simulated and actual policy rates and inflation expectations. We also experimented adding more arguments to the Taylor rule: the output gap and the change in the exchange rate over the previous month. The coefficients on these variables, however, were not significant and the dynamic simulations of the extended version of the rule did not provide any substantial improvement on the baseline with inflation expectations only. Importantly, the coefficient on the deviation of expected inflation from the target is greater than 1.0, consistently with a policy that does not accommodate inflation and thus raises real interest rates when inflation expectations increase.[3]

Considering the size of our sample of monthly observations, and since the survey of inflation expectations is run daily, we checked for robustness by re-estimating the model on daily data. Estimation of this Taylor rule using daily data over the same sample delivers the following results

$$y_{t,t+1} = \underset{0.003}{0.99} y_{t-1,t} + (1 - 0.99)\left(\underset{0.41}{17.27} + \underset{0.58}{1.94}\left(\pi^e_{t,t+12} - \pi^*_t\right)\right) + u_{1t} \qquad (13)$$

[3]Inflation expectations as measured by the central bank's daily survey work extremely well in our Taylor rule, to the point, as mentioned in the text, that no other variable appears to be signifcant. This survey comes from a sample of 100 financial market participants. One cannot rule out the possibility that their answers to the survey reflect not their true expectations about future inflation, but their anticipation of the way the central bank responds to the survey–that is one cannot rule out that they act strategically.If this were true, actual inflation might move quite differently from that imlied by the survey, and not beacause of errors in expectations.

which are completely in line with our monthly estimation, given that the only different coefficient is the one on the lagged dependent variable. Such difference, however, only reflects the different frequency of the data (note that $(0.99)^{20} = .82$.).

Dynamic simulation of the two-equation model obtained by considering this Taylor rule, jointly with an equation for inflation expectations, allows us to generate the starred variables in equation (3). As already noticed, under the null that agents form their expectations using our model, the difference between the observed long-term yields to maturity (fixed interest rates on swaps) and our theoretical yields to maturity–defined as the average of future policy rates, our starred variables–measures term premia. These can be read off Figure 5 as the distance between the two curves which represent, respectively, fixed interest rates on swaps and simulated yields at 6-month, 12-month and 18-month maturities.

In Figure 6 we report this difference, $\left(y_{t,T} - y^*_{t,T}\right)$, that is our measure of term premia at different maturities, and the yield spreads between Brazilian Brady bonds and US government bonds of the same maturity. The Figure shows a very high correlation between Brady bonds spreads and our constructed variables. Moreover, our measures get closer to the Brady bond spread as difference between the maturity of our fixed interest rates swaps and that of Brady Bonds becomes smaller. The correlation between $\left(y_{t,T} - y^*_{t,T}\right)$ and Brady bonds spreads at different maturities is reported in Table 1 .

Table 1: Correlation between Brady bonds spreads and our measure of term premia at different maturities

Brady spreads	$\left(y_{t,t+6m} - y^*_{t,t+6m}\right)$	$\left(y_{t,t+1y} - y^*_{t,t+1y}\right)$	$\left(y_{t,1.5y} - y^*_{t,1.5y}\right)$
1	0.6	0.68	0.79
	1	0.95	0.89
		1	0.97
			1

Notice, in Figure 7, that there are a few observations in which $\left(y_{t,T} - y^*_{t,T}\right)$ becomes negative. Country premia cannot, obviously, be negative: this result can only be explained by the existence of expectational errors that might contaminate $\left(y_{t,T} - y^*_{t,T}\right)$ as a measure of country risk. Interestingly, the episodes in which $\left(y_{t,T} - y^*_{t,T}\right)$ becomes negative coincide with a turning point in the

behavior of inflation expectations, which might explain why our dynamic autoregressive specification might generate expectational errors.

However, if our model for expectations is not systematically wrong, there is a natural way of filtering the effect of expectational errors out of $\left(y_{t,T} - y^*_{t,T}\right)$: averaging over time. This is not implementable in our monthly model, considering the length of the sample, but we can do it at daily frequency. We thus simulate our daily model to derive a measure of risk premia as a 90-day centered moving average of daily $\left(y_{t,T} - y^*_{t,T}\right)$

$$\hat{L}_{t,T} = \sum_{i=-45}^{45} \left(y_{t+i,T+i} - y^*_{t+i,T+i}\right)$$

In addition, the size of our sample of daily observations allows us to simulate the model stochastically and hence to construct confidence intervals around our starred variables. This provides a more precise indication of the statistical significance of our measure of term premia, since it takes explicitly into account the uncertainty surrounding our model of interest rates determination. To illustrate the point we report, in Figure 7, the 12-month fixed interest rate swap rate, along with the $y^*_{t,t+12}$ rate and its 95 per cent confidence interval. The confidence bands allow to pin down precisely periods in which $y_{t,t+12}$ has been significantly different from $y^*_{t,t+12}$. Importantly, whenever the average term premia becomes negative, $y^*_{t,t+12}$ is not significantly different from $y_{t,t+12}$. We conclude that the evidence from daily data supports our choice of using moving averages to filter the effect of expectational errors out of our data.

By taking $\hat{L}_{t,t+180}\hat{L}_{t,t+360}, \hat{L}_{t,540}, \hat{L}_{t,720}$we construct forward risk premia. In particular we derive $\hat{Lf}_{t,t+180}\hat{Lf}_{t,t+180,t+360}, \hat{Lf}_{t,t+360,t+540}, \hat{Lf}_{t,t+540,t+720}$to obtain measures of term premia for a constant 6-month investment horizon, at time t, at time t+6 month, at time t+12 months and t+18 months. These measures are reported in Figure 8. The upper panel reports the term structure of 6-months forward risk premia at four different dates: December 2000, September 2001, April 2002 and May 2002. The lower panel reports time series of risk premia between time t and time t+6 months (RP6MA), time t+6 months and time t+12 months (RP_6_12A), time t+12 months and time t+18 months(RP_12_18a), and time t+18 months and time t+24 months(RP_18_24a), all constructed on the basis of expectations for inflation, monetary policy and observed swap rates at time t. To understand the

difference between the two figures,note that the upper panel is a slice of the lower one taken at four particular dates.

Summary of our empirical findings

Our findings can be read off Figure 8. These figures clearly show that the term premium, after having peaked in October 2001, in February 2002 had came back to levels close to those prevailing at the beginning of 2001. In May 2002 we observe a sharp shift of the whole term structure of risk premia. The term structure of forward premia (term premia at a 6-months horizon, now, 6-months from now, 12-months from now and 18-months from now) as measured in mid-May 2002 does not reveal any shift in the expectation of term premia up to Spring 2003. The 6-month risk premium for the period May to October 2002 is slightly below 500 basis points, almost identical to the 6_months risk premium for the period November 2002-April 2003. The 6-months ahead risk premium rises to about 700 basis points for the period May-October 2003 to reach 1200 basis points for the period November 2003-April 2004. The increase in the six-month ahead term premia occurring around the Spring 2003 roughly corresponds to the beginning of the operation of the new government after the election in Fall 2002.

The upward shift in the term structure of forward risk occurred between February 2002 and May 2002 could be linked to electoral uncertainty. However, even during the honeymoon of mid-February, when the yield curve had flattened and term premia were at the lowest level in the last three years, the Brady bonds spread for Brazil was some 400 points above that for Mexico. Thus, independently from short-term fluctuations, the level of the Brazilian term premia reveals markets' concerns about the sustainability of the debt.

3 Central bank independence: some principles and the empirical evidence

> "Monetary policy requires long time horizons because the lags through which interest rate changes affect output and inflation are typically long. If monetary policy decisions were left to politicians, on a day-by-day basis, the temptation to reach for short term gains at the expense of the future (that is, to inflate too much) would be hard to resist, especially in the run-up to an election. Knowing this, many governments wisely try to depoliticize

> monetary policy by, e.g., putting it in the hands of unelected technocrats with long terms of office and insulation from the hurly-burly of politics." (Alan Blinder, 1998, pp.56-57.)

There are two sides to central bank independence (CBI): *goal independence* means that the central bank sets its own goals–the inflation target and the tradeoff, if any, between output and inflation objectives–rather than their being set by the government; *instrument independence* means that the central bank has control over the instruments of monetary policy, and is allowed to use them at will. The Bank of England has instrument independence, but its goal, the inflation target, is set by the government. The ECB has both goal and instrument independence: the bank's statutes specify the objectives of monetary policy and their ranking (price stability first and, conditional on price stability being secure, supporting the economic policies of EMU member states), but it is the bank who chooses the inflation objective: it has both goal and instrument independence.

The success of the Bank of England since it was made independent, in 1998, suggests that it is instrument independence what matters most. There is in fact a good argument in favor of the view that the inflation objective should be jointly decided by the government and the central bank: a country's inflation rate is jointly determined by monetary and fiscal policies, including, importantly, incomes policies. If the central bank were to choose an inflation objective very different from that aimed at by the government, it might achieve it in the very long run, but in the meantime output volatility could be very high. One should never forget that no law is irreversible: there is nothing that stops a Parliament from stripping a central bank of its independence–as recent events in Poland vividly indicate. Goal independence does not look like a very smart idea.

Instrument independence, that is the freedom to set interest rates, should not, however, be discounted as a merely technical matter. The central bank will typically hold a very different view from the government on the monetary transmission mechanism, its lags and long run effects–a view that most often reflects the different discount rates of central bankers with long terms of office, and politicians who periodically face elections. When this happens, the bank must be shielded from pressure by the government and should have the power to set interest rates independently.

All of this empirically reduces to a very simple requirement. Central bankers should have relatively long terms of office: 6-8 years are typical terms

in many countries, a period long enough to extend across electoral cycles. Terms of office should also be timed so as not to coincide with elections. Once appointed, central bankers should be expected to sit down with the government at regular intervals, and agree on an inflation target; thereafter the law should shield the governor, and the monetary policy committee, from political pressure.

There are many other facets to the design of an optimal central bank. The number, composition and appointment process of the members of the monetary policy committee; the operation of the inflation target, including, importantly, provisions for accountability and a transparent process for building and explaining the bank's inflation forecast. Brazil follows best international practice on all these aspects: there is no need to dwell on them further.

Why is CBI so important? Does the evidence support the view that countries with independent central banks have superior economic performance? There are two key findings from cross-country studies on the relationship between CBI and economic outcomes (see Grilli et al., 1991 and Cukierman, 1992 for examples of this empirical work, and Drazen 2000 for a useful summary.) First, a high degree of CBI is correlated with low inflation. Grilli et al. show that there are high debt countries marked by low political stability, which nonetheless have relatively independent central banks and which maintain low inflation, suggesting that CBI may help induce price stability even when the politics and budgetary pressures are unfavorable (Belgium offers one such examples.) A second key finding is that a higher CBI brings about lower inflation, but no worse performance in terms of real variables–such as the level or variance of output growth, or the tradeoff between the average inflation rate and the variance of output (see e.g. Alesina and Summers, 1993).

A different interpretation has been offered for these empirical findings. Posen (1995) argues that monetary institutions reflect the outcome of the conflict of interest in a society over inflation policy. Not that laws and institutions don't matter, but their effectiveness depends on the political support given to the price stability goal–another way of saying that there is no institution a Parliament cannot get rid of. Because the financial industry is the segment of society most likely to support a low inflation policy, CBI should be highest where the financial industry is strongest. Posen builds an index that captures, at the same time, the strength of the financial sector and its ability at translating such strength into independent monetary institutions.

When used in the cross-country regressions mentioned above, this index does better than traditional measures of CBI in explaining the cross-country distribution of low inflation performance. It is precisely because the political game surrounding the decision to make the central bank independent is a difficult one, that president Cardoso should consider leaving such a law to the next Congress as a welcome parting gift. Of course, Posen's results suggest that once the new law is in place its effectiveness might depend on the relative power of the financial industry from Sao Paulo in Brazil's political game.

Summing up

Brazil's central bank has so far been extremely skillful. Shocks will come, mistakes will unavoidably be made and political pressures will build up. When that happens the bank needs an instituional structure that shields it from outside pressure and allows it to explain to the public that monetary policy resembles more to a piece of art, than to an easy-to-drive machine. A law granting independence to the central bank will not guarantee low inflation and stable growth, but would go along way toward raising the chances that the inflation success of the past three years will not be waisted.

4 A market-friendly measure of the size of the Brazilian debt

There are two ways to compute how large is a country's stock of debt. The first starts from the consolidated balance sheet of the public sector, adds up all the liabilities (of the central government, the states and other local administrations, the public enterprises, the central bank, etc.), and subtracts the value of the liquid assets held by the public sector: mainly foreign exchange reserves and, bank deposits. In other words, it tries to build a measure of the debt *net* of the government's liquid assets. The alternative is simply to add up the value of all public sector bonds and bills held in the market.

The problem with the first method is that once you start subtracting the value of public sector liquid assets it is hard to decide where to stop. For instance, should the credits vis-à-vis the private sector acquired by the government, or by the central bank, during a bank restructuring operation be included, and should they be valued at par ? Why not subtract the value

of public sector enterprises, especially if they have been partly privatized and their shares are traded[4].

An alternative, more market friendly definition, looks at the stock of bonds and bills in the hands of the public, both at home and abroad. Of course this measure does not recognize that the government owns assets, as well as liabilities. Instead it takes the view that what matters, from the point of view of market participants, is how much "room" should be made in private portfolios to accommodate the paper issued by the government and by other public sector entities. Even when government assets are traded, so that their valuation is not an issue, it makes a big difference whether the private sector is asked to buy only bonds and bills or, for instance, a combination of government paper and shares in Petrobras. Financial assets are not perfectly substitutable–after all this is the reason why privatizations are not financially neutral even absent an improvement in efficiency after the firms have been transferred to private owners.

The two approahes do not produce very different results: in May 2002 the debt-to-gdp ratio was 60,3 per cent using the traditional accounting method, 65.7 per cent considering the stock of paper held by private sector investors. Tables 2A and 2B show the simple arithmetic. [5].

[4]For a thorough analysis of the quality of net debt figures for Brasil see Belilacqua and Werneck (1999).

[5]These computations do not include "hidden liabilities". To the extent that over time such liabilities are recognized, they raise the level of the debt. See e.g. Giambiagi and Além (2001).

Table 2A: Net debt in May 2002

(R$, million and per cent of GDP)	
Gross debt of the general government	956.1 (75.6%)
+ Liquid debt of the central bank	-7.9
+ Liquid debt of state-owned enterprises	26,7
= Gross debt of the public sector	974.85 (77.1%)
- Credits of the general government (a)	- 266.4
= **Net debt of the public sector (official definition)**	**708.5 (56.0%)**
Subtracting only liquid assets (b)	
Net ebt of the public sector	708.5 (56.0%)
+ Labor assistance fund (FAT)	+ 54.7
= **Net debt of the public sector (alt. definition)**	**763.2 (60.3%)**

Source: Banco Central do Brasil, Nota Para a Impresa, Quadro XLVI

(a) the official definition of government credits includes, beyond the liquid assets indicated below: Assets of the Social Security and of the "Fundo de Amparo ao Trabalhador", taxes collected by the banks but not yet paid to the government (arrears), and various credits vis-à-vis states and municipalities. It does not include the value of public sector enterprises. (b) The Labor assistance fund (FAT), managed by the Caixa Economica Federal, has two functions:it manages unemployment insurance and wage support, and it finances subsidized credits, which constitute its assets.These rea not very liquid assets.

Table 2B: Debt in the hands of the public in May 2002

(R$, million and per cent of GDP)	
Internal Treasury debt in the hands of the public (a), (b))	532.2
Internal Central Bank debt in the hands of the public (c)	107.2
Total internal debt in the hands of the public	639.4 (50.6%)
Total external gross debt (d)	201.6 (15.9%)
- investments of government entities in mutual funds	9.7
Total debt in the hands of the public	**831.2 (65.7%)**

Source: Divida Pùblica: Plan Anual de Financiamento 2002, Anexo III, Table I-B and Ministério da Fazenda, Resultado do Tesouro Nacional, December 2001.

(a) LTN's, LFT's, NTN's, CFT's. (b) this corresponds to the difference between the total stock of Treasury bonds issued (R$ 670.29) and those held by the Banco do Brasil (R$ 184).

This breakdown is available in Resultado do Tesouro Nacional, Table A7. (c) BBC's, LBC's, NBC's

5 Is 3,75 per cent a large-enough primary surplus ?

Contrary to Argentina, Brazil has made significant progress in its fiscal accounts. In 1998, the year before the devaluation, neither Brazil nor Argentina had a primary surplus. Since then Argentina has kept the primary budget close to balance, while Brazil has consistently generated a surplus which reached 3,75 per cent of gdp in 2001 (see Figure 9).

INSERT FIGURE 9 HERE

Brazil's fiscal achievements, however, have not stopped the debt-to-gdp ratio from growing: since 1999, the public sector debt in the hands of the public (the second of the definitions discussed above) has increased by almost 20 points in percent of gdp: from 46 to 65 per cent. This is because in each of the past three years, with the exception of 2000, the primary surplus has been insufficient to keep the debt-gdp ratio constant. Figure 10 reports the result of a simple exercise of debt arithmetic. The figure shows, along with the realized level of the primary surplus, the level of the surplus that would have been required to keep the debt ratio stable: this is simply $[(r-g)/(1+r)(1+g)](B/Y)$, where r is the average real interest rate on the debt and g the growth rate of real gdp. In computing the cost of debt service (which is shown with a line in the figure) we have included the portion due to the devaluation of the exchange rate–that is, each year we have valued foreign currency debt at its current market value, even if the bonds were not coming due. (This explains why the cost of debt service jumped in 1999, reaching almost 14 per cent of gdp.)

During 2001 the level of the primary surplus that would have kept the debt ratio constant was 3.5 points higher than the actual primary surplus, that is 7.2 per cent of gdp instead of 3.7 per cent.[6] The 20 per cent exchange rate depreciation that occurred during 2001 is only part of the explanation: had the exchange rate been stable, the average cost of debt service would have been (instead of 9 per cent of gdp) 7,3 per cent. Even at this level of debt service the 2001 primary surplus would not have been sufficient to stabilize the debt–a shortfall of 1,7 per cent of gdp. Alternatively, one could

[6] Another, and possibly simpler way to look at this, is to consider the increase in the debt ratio during 2001–which was exactly 7 percentage points of gdp.

ask what the real growth rate should have been, given inflation and the cost of debt service, to keep the debt-gdp ratio stable. The answer is 8 per cent, as opposed to the 2 per cent realized in 2001.

INSERT FIGURE 10 HERE

Reflecting on the fiscal situation in Brazil, it is instrutive to look back at the Italian stabilization of the mid-nineties, since it bears many of the features that Brazil experiences today. The lower panel of Figure 10 documents the evolution of the primary surplus, of the debt-stabilizing primary surplus and of the cost of debt service in Italy from 1990 to 2000.

The level of the debt-stabilizing primary surplus obviously depends on the average cost of debt. In Italy, in 1994 and from 1996 onwards, the debt-stabilizing primary surplus falls because the average cost of debt falls. It is thus difficult to argue what should come first–the fall in spreads, or the increase in the primary surplus. Still the Italian experience, reviewed at some distance, allows to make two points.

- First it shows the dramatic effect of a slowdown in growth on the level of the debt-stabilizing primary surplus: we see this very clearly in 1991 and 1993, two years of low growth.

- Second, the virtuous circle of a falling average cost of debt and lower debt-stabilizing surpluses started in Italy around 1997, a year in which the primary surplus exceeded 6 per cent of gdp. This is a level that would have been suffcient to stabilize the debt in almost every year of the decade, with the only exception of the 1991 recession. One cannot rule out that financial markets interpreted the determination and the ability to bring the surplus to such a high level, as an important signal, to which they responded by moving to a permanently lower cost of debt.

5.1 Debt sustainability and output volatility

The condition for the sustainability of the public debt that we have used in the debt arithmetic exercise discussed above implies a comparison between the real interest rate paid on the debt and the growth rate of the economy: the higher the real rate, for a given growth rate, the higher the primary surplus needed to keep the debt-to-gdp ratio stable. This condition, however, assumes that the volatility of the real rate and of the rate of growth can be overlooked–at least as a first approximation. This is fine in relatively stable

macroeconomic environments, but when volatility is high, overlooking it may seriously bias the condition for sustainability. In what follows we explain how volatility (of output and interest rates) modifies the condition for long run sustainability of the debt.

When growth and the real interest rate are volatile, sustainability depends on the mean of the difference between the growth rate and the real rate, as well as on their variance and covariance. Assume, to keep the example simple, that the government's primary surplus is zero and that the joint stochastic process defining the evolution over time of the growth rate and the interest rate is

$$x_t = \bar{x} + u_t$$

with

$$x_t = \log\left(\frac{1+r_t}{1+g_t}\right)$$

$$u_t = \frac{v_t}{1-\rho L}$$

$$v_t \sim N(0, \sigma^2(v))$$

where r and g are, respectively, the real interest rate on the debt and the growth rate of the economy, v are i.i.d. shocks (normally distributed, with a zero mean and a variance equal to σ^2), L is the lag operator and $0 < \rho < 1$. This assumes that the ratio of the real rate to the growth rate is stochastic and that shocks to this ratio are persistent–their degree of persistence being described by the parameter ρ. Defining b the debt-to-gdp ratio, the condition that guarantees that this ratio does not increase forever, correctly taking into account volatility, is:

$$\lim_t E_0 b_t = 0 \quad if\ and\ only\ if \quad \bar{x} + 0.5\left(\frac{\sigma^2}{1-\rho}\right) < 0$$

For $\sigma^2(v) = 0$, that is when volatility can be overlooked, the sustainability condition reduces to $\bar{x} = r - g < 0$, that is the condition we used in the previous paragraph. But in the presence of volatility, the greater is the variance of the shocks to the ratio of the growth rate to the rate of interest, and the greater is their persistence (ρ close to 1), the larger the primary surplus needed to stabilize the debt, for any given level of the debt-to gdp ratio.[7]

The simple point this example makes is that debt sustainability depends on volatility of international financial markets, of domestic output and of domestic interest rate spreads. An increase in volatility can push a country off a path that was up to that moment sustainable. If this happens, and the country fails to increase the primary surplus suitably, the perception that the public (or foreign) debt may not be sustainable, will result in higher spreads and make the situation even worse.

The message is that a country like Brazil, that lives in a very volatile macroeconomic environment, should realize that the condition needed to stabilize the debt is more demanding than what other countries would face with a similar debt-gdp ratio,but with less volatility.

This point is implicitly made in the recent IMF World Economic Outlook (April 2002). Table 4, reproduced from the WEO, shows the relationship between output volatility (measured by the standard deviation of output growth) and the frequency of "debt events", that is defaults or debt restructuring operations. The data confirm that the frequency of such events is higher in volatile environments, suggesting that governments in such environments often do not realize the fiscal implications of volatility, and fail to keep the level of the primary surplus in line with the requirement imposed by the effects of macroeconmic volatility.

[7] Sustainability here is defined imposing that the expected value of the debt-gdp ratio is zero. This condition does not rule out the possibility that there exist individual paths along which the debt-gdp ratio diverges. For a discussion see Blancahrd and Weil (2002).

Table 4: Output volatility and debt events (defaults or debt restructurings)

	Events per country	st. dev. of gdp growth
1971-80		
Latin America	.44	3.79
Emerging Asia	.25	2.91
Advanced economies	-	2.50
1981-90		
Latin America	.89	4.89
Emerging Asia	.13	2.85
Advanced economies	-	3.05
1991-2000		
Latin America	.33	3.74
Emerging Asia	.25	4.11
Advanced economies	-	2.09

Source: IMF, WEO, April 2002.

6 Debt management

6.1 Lengthening debt maturity

Interest rates, at the start of a stabilization, are typically high. Short rates are high because the stabilization plan often involves a disinflation, or the attempt to avoid the pass-through onto domestic prices of a devaluation. Long rates are high because, when it is announced, a stabilization plan typically does not enjoy full credibility among investors: long-term interest rates are thus higher than policymakers' expectations of future rates.

The evidence from episodes of fiscal stabilization occurred in OECD countries during the past three decades[8] shows that governments, at the start of a stabilization, tend to increase the share of fixed-rate long-term debt denominated in the domestic currency

- the higher is the conditional volatility of short-term interest rates,
- the lower is the level of long-term interest rates, and
- the stronger is the fall in long-term rates that follows the announcement of the stabilization program.

By contrast, conventional measures of the relative cost of issuing long-term debt, such as the long-short interest-rate spread, are not significant.

This evidence suggests that debt managers tend to prefer long to short maturity debt because they are concerned about the risk of refinancing at higher than expected interest rates. However, when long-term rates are high relative to their expectations, they issue short maturity debt to minimize borrowing costs.

This observation is consistent with the view expressed by Campbell (1995) that a committed government can reduce the cost of debt servicing by issuing short-term debt. High interest rates on long-term bonds may reflect credibility problems, rather than term premia: since the government's resolution to carry out a stabilization is not known to the private sector, long rates may remain high until the time when the uncertainty is resolved. [9]

[8] See Missale et al.(2002).

[9] Moreover, but this is a more subtle argument, issuing short-term debt can yield additional benefits to the extent that it signals the government's intentions: by shortening debt maturity committed governments may distinguish themselves from less determined ones. See again Missale et al. (2002)

While explaining why debt managers are often cautious in lengthening the maturity, these observations also point to the benefits of issuing long-dated debt. Building a liquid market for the debt at long maturities is a necessary requirement of any successful stabilization. Italy, as Figure 11 shows, took more than a decade to reach this point. There are two reasons why lengthening debt maturity (both the average life of debt and its duration) is important: (i) exposure to short term interest rate fluctuations, and (ii) the roll-over risk. Although related, the two risks are different. A long duration reduces the elasticity of the cost of debt service to fluctuations in policy rates: it thus eliminates an important constraint on monetary policy. Long-dated debt allows the Treasury to spread out roll-overs, thus reducing the risk of a funding crisis, that is the risk of going to the market to roll over a large volumes of bonds at a time when interest rates are particularly high and the market particularly thin.

INSERT FIGURE 10

Why issuing short-maturity debt is costly

There is an interesting way to think at how short maturities raise the risk exposure of investors–and thus the premium they require to hold the debt.

Whenever a government issues such a bond, it is also implicitly issuing a guarantee. To see why this is the case, and to understand the consequences, consider this identity[10]:

Risky security = Default Free security – Guarantee

Where "default" can happen via explicit repudiation, inflation or currency devaluation. Whenever an investor buys a bond that carries some degree of country risk, his position can thus be decomposed in the sum of two functionally distinct activities: the purchase of pure default-free bond, and the bearing of default risk by the investor.

The equivalence between a risky bond and the combination of a riskless security plus a guarantee suggests the analogy between a bond that carries country risk and a financial option. The guarantee component of the bond is like a put option, that is a binding commitment to pay the face value of the

[10] see e.g. Bodie and Merton (1992)

bond, in case the borrower, when the security expires, is unable to repay—or reduces the real value of the debt through inflation, or currency depreciation.

Figure 11 uses the Black-Scholes formula to show what happens to the government's exposure to risk as the duration of the debt shortens, for a given volatility of the asset underlying the securities issued–that is the country's GDP (see Draghi et al.,2002). The vertical axis reports the "hedge ratio", that is the change in the value of the guarantee as a function of the value of the underlying asset–in our case the country's GDP. Consider what happens when the duration of the debt shortens, from 12, to 6, to 3 months, and GDP falls below trend–i.e. the put option goes out-of-the money, that the price of the underlying asset falls below 105 (the strike price in the graph[11]). The govrnment's exposure (the hedge ratio in option jargon) increases as the duration of the debt falls–and the risk premium will rise correspondingly. Brazil a market for long-dated securities does not yet exist. As the stabilization gains credibility, this is an issue the government cannot overlook.

INSERT FIGURE 11 HERE

Bonds with a (European) put option

Emerging markets borrowers have recently used innovative financial instruments to lengthen the maturity of the debt. One example are bonds containing a (European) put option [12]. This instrument provides the creditor (the investor) with the right, but not the obligation, to redeem the bond at a pre-determined date before the maturity date. Borrowers write put options as a means to achieve lower spread in the belief that over time spreads will decline, or at least remain stable, in which case the put would not be in the money, and would not be exercised. Bonds carrying a (European) put option allow the government to lengthen the maturity of the debt without paying the premium that the market is asking. Such premium often arises not so much from a different assessment, by the government and by market participants, of the outlook for trend inflation, but rather from the incentive the government has–and that market participants anticipate–to raise the inflation rate ex-post in order to reduce the real cost of debt service. This non-cooperative "game" between the government and investors may thus result in a perverse equilibrium: by sticking to their inflation objective the

[11]The figure is build for the following parameter values: isk free rate = .04, volatility = .50, strike price = 105.

[12]Fore examples of other instruments, see IMF (2002)

Authorities end up paying, ex-post, a real interest rate that would require a politically impossible level of the primary surplus. Put options eliminate the Authorities' incentive and thus the market's anticipation of such an incentive.

While lengthening the *maturity* of the debt, because bonds with a put option are issued at long maturities, these instruments do not lengthen the *duration* of the debt by the same amount, since the presence of the put option makes the duration of the bond shorter than its maturity. These bonds, however, are different from floating rate instruments, that is long-dated bonds with a coupon indexed to the short-term rate–an instrument often used to lengthen the maturity of the debt. Both, bonds with a put option and floaters, share the benefit, over short-term bills, of reducing the amount of debt that must be rolled-over at each auction: they thus reduce the risk of a funding crisis[13]. The similarities, however, end here. The two instrument are very different in their response to fluctuations in short-term rates: they are thus very different in the constraints they impose on monetary policy. The interest rate on floaters moves one-by-one with the short-term rate: thus, whenever the central bank must raise interests rates, for instance to offset an increase in inflation expectations, the cost of floaters rises correspondingly. The cost of bonds with a put option, on the contrary, does not move–and the probability that the put will be exercised increases proportionately to the length of the period during which the central keeps short-term rates high.

Bonds with an embedded put feature, however, are not without risks, even if the exercise date is pre-determined: If the exercise date coincides with a crisis, and the put option is in the money, the cost of debt service will increase, putting further pressure on the markets, and making an difficult .situation worse.[14]

Bonds that include a put option have been used by a number of emerging market countries in recent years (See table 5.) In a situation similar to that of Brazil today (high short term interest rates and the virtual absence of fixed-coupon long dated government securities). Italy starting issuing bonds

[13]Note that this feature requires that the option attached to the bond is a "European" option, that is one that can only be exercised at a pre-determined date. "American" options would of course expose the government to the risk that the option is exercised precisely during a crisis, when spreads are high and markets illiquid.

[14]An alternative are "callable" bonds that is bonds which contain an American call option. This gives the government the option to retire the bonds if the stabilization is successful and interest rates fall faster than the market had anticipated. The market's appetite for callables, however, has been very modest.

with a put option in 1988 [15]. Table 6 describes the condition of the bonds issued in December 1988. At the time Italy was issuing 2- and 4-year fixed coupon instruments. The new bonds with the put feature had an 8-year maturity and thus allowed the government to double the existing maximum maturity. The option could be exercised after 4 years: for the option to be "out of the money" at the exercise date, short term rates had to fall to 8.14 percent. The current market expectation, implicit in the yield curve was 13.27. Between 1989 and 1992 these bonds accounted for 12 per cent of total Treasury issues of medium- and long–term bonds.

[15] Similar bonds existed at the time in the U.K., under the name of "retractable/extendible bonds".

Table 5: Emerging market sovereign issues of bonds with a put option

	Volume (U.S.$ bl.)	# of issues	% of value of all issues
1997:I	2,7	17	5%
1997:II	0,3	5	0,7%
1998:I	2,7	4	4,4%
1998:II	1,4	8	5%
1999:I	1,2	4	3%
1999:II	1,3	8	5%
2000:I	0,08	1	0,2%
2000:II	1,2	6	5%
2001:I	-	-	
2001:II	2,1	3	9%

Source: IMF, 2002.

Table 6: Italy, Characteristics of the bonds carrying a put option (CTO) issued in December 1988

effective gross yield after 4 years	12,48
effective gross yield after 8 years	11,80
indifference yield at redemption date	10,78
pro-memoria	
current yield on 2-year fixed coup. bonds	12,38
current yield on 4-year fixed coup. bonds	13,31
forward O/N rate at year 4	13.27
indifference O/N rate at year 4	8.14

The bonds had an 8-year maturity. They could be redeemed after 4 years

6.2 Privatizations, securitizations and equity return swaps

Debt management can contribute in two ways to reducing the burden of the debt: (i) by lengthening the maturity and the duration of the debt, as discussed above, it can free debt service from short run monetary policy, and reduce the risk of a funding crisis; (ii) through privatizations, asset securitization and equity return swaps it can increase the diversification of investors' portfolios, and thus contribute to reducing the cost of debt service. In other words, debt management is a wider concept than simply the choice of the liabilities a government issues. The problem should really be approached as the asset and liabilities management of a private company. This brings privatizations, assets securitization and other financial instruments, such as equity swaps, at the center of debt management.

6.2.1 Privatization

The Brazilian government owns a large number of assets of varying degree of liquidity. If all these assets could be subtracted from the gross debt figures, the net debt would obviously be significantly smaller. As discussed in Section 1, however, it makes a big difference whether investors are asked to hold a portfolio consisting of 10 units of Petrobras shares and 100 units of debt, or 80 units of debt and 30 of Petrobras shares. Privatizations allow investors to hold more diversified portfolios, and thus reduce the premium on the bonds they are asked to hold.

By transferring the control of a company to the private sector, the return on the company often increases: this happens because political objectives no longer interfere with value maximization, and thus management improves. What this means is that computing a country's net debt by simply subtracting from gross debt the value of government-owned assets is not the same as selling those assets. By privatizing, and cashing in on the value of the higher efficiency of a private, as compared to a state-owned company, the government can reduce its liabilities even below what the net debt figures may suggest.

This point is even stronger in the case of companies that are entirely (or almost entirely) owned by the government, such as the Caxa Financera or the Banco do Brazil. There are two problems with these companies: first, the efficiency gains from transferring their ownership to the private sector is

highest; second, until they are privatized nobody really knows how much they are worth: this makes computing net debt figures an impossible exercise.

The revenue from privatizations should be kept separate from the budget. Some countries in Europe have adopted laws that assign the revenue from privatizations to a special account that can only be used to retire existing debt. While this distinction might seem artificial (in principle retiring existing bonds or issuing a smaller amount of new bonds should make little difference) it is important for two reasons: (i) it avoids the illusion that could be generated by PSBR (public-sector-borrowing-requirement) numbers that improve only thanks to the revenue from privatizations; (ii) it creates an instrument, the account, that can be used for debt management, for instance to smooth out possible concentrations in debt roll-overs.

6.2.2 Securitization

An argument similar to that just made for privatizations, can be made for the securitization of less liquid government assets, such as real estate or loan books acquired during the restructuring of commercial banks. Once again, the value of these assets, while in the hands of the government, is difficult to estimate. The incentive to properly manage the assets (the incentive to recover bad loans, for instance) is very different once the asset is transferred to the private sector. In other words a "bad loan" with a face value of 100 dollars might be sold for as little as 20 dollars: low as the value might be it reduces the gross debt and improves the government's financial situation in ways that cannot be achieved as long as the loans sit in the books of the government. Similarly for real estate and the revenue from renting it out. [16]

6.2.3 Equity swaps

One should not disregard the political constraints that often make privatizations difficult. While there is no real alternative to the transfer of ownership to the private sector, the alternative is not between privatizing, and simply waiting. Modern financial markets offer instruments that allow a government that is not ready to sell, to reap at least some of the benefits of privatizations. These benefits mostly come from diversification. But, as we discuss later in this section, they may also come a reduction in the risk of expropriation

[16] On securitizations see IMF (2002) chapater V, which also discussed the structures fro the securitization of future revenue flows.

Suppose that government revenue were heavily exposed to a specific industry, say oil. If the government swaps the return on government-owned oil companies for the return on a world portfolio–say the S&P 500 it would reduce the budget exposure to fluctuations in the price of oil, and would thus eliminate an element of idiosyncratic risk from its liabilities. To the extent that the benefits of greater diversification are priced by the market, the swap helps lowering the spread on government bonds.

Notice that equity swap enable a country to diversify internationally without violating restrictions on investing capital abroad, or political constraints that make it difficult to transfer to non-residents the control of large domestic companies operating in industrial sectors thought to be strategic, such as oil. Bodie and Merton (2002) describe a simple example of the operation of currency swaps. The example (which we summarize) uses the case of a pension fund, but it can easily be extended to the case of a government.

Suppose that small-country pension funds who already own the domestic equity were to enter into swaps with a global pension intermediary (GPI). In the swap, the total return per dollar on the small country's stock market is exchanged annually for the total return per dollar on a market-value weighted-average of the world stock markets. This exchange of returns could be in a common currency, dollars, as described or adjusted to different currencies along similar lines to currency swaps. The magnitudes of the dollar exchanges are determined by the "notional" or principal amount of the swap to which per dollar return differences apply.

The swap effectively transfers the risk of the small-country stock market to foreign investors and provides the domestic investors with the risk-return pattern of a well-diversified world portfolio. Since there are no initial payments between parties, there are no initial capital flows in or out of the country. Subsequent payments, which may be either inflows or outflows, involve only the difference between the returns on the two stock market indices, and no "principal" amount flow.

For example, on a notional or principal amount of $1 billion, if, ex post, the world stock market earns 10 percent and the small-country market earns 12 percent, there is only a flow of (.12 - .10) x $1 billion or $20 million out of the country. Furthermore, the small-country investors make net payments out precisely when they can "best" afford it: namely, when their local market has outperformed the world markets. In those years in which the domestic market under-performs the world stock markets, the swap generates net cash flows into the country to its domestic investors. Hence, in our hypothetical

example, if the small-country market earns 8 percent and the world stock market earns 11 percent, then domestic investors receive (.11 - .08) x $1 billion = $30 million, a net cash inflow for the small country. Moreover, with this swap arrangement, trading and ownership of actual shares remain with domestic investors.

Foreign investors also benefit from the swap by avoiding the costs of trading in individual securities in the local markets and by not having the problems of corporate control issues that arise when foreigners acquire large ownership positions in domestic companies. Unlike standard cash investments in equities or debt, the default or expropriation exposure of foreign investors is limited to the difference in returns instead of the total gross return plus principal (in our example, $20 million versus $1.12 billion).

The potential exposure of foreign investors is probably less for the swap than for direct transactions in individual stocks. Not only because swaps only imply an exposure to flows of returns, rather than to the total value of the underlying asset. It is also more difficult to manipulate a broad market index than the price of a single stock. Even if settlement intervals for swaps are standardized at six months or one year, the calendar settlement dates will differ for each swap, depending upon the date of its initiation. Hence, with some swaps being settled every day, manipulators would have to keep the prices of shares permanently low to succeed.

Furthermore, with the settlement terms of swaps based on the per-period rate of return, an artificially low price (and low rate of return) for settlement this year will induce an artificially low high rate of return for settlement next year. Thus, gains from manipulation in the first period are given back in the second, unless the price can be kept low over the entire life of the swap. Since typical swap contract maturities range from two to ten years (with semi-annual or annual settlements), this would be difficult to achieve.

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Figure 1: Brazilian interest rates: overnight (SELIC), and fixed interest rates on 6-month, 12-month, 18-month and 24-month swaps

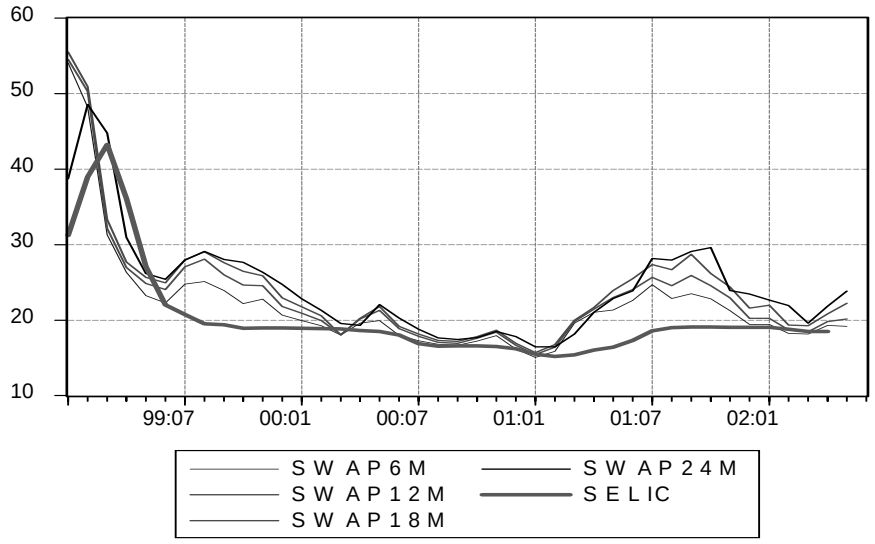


Figure 2: Brady Bonds spreads (Brazil and Mexico) and the level of the US 10-year yield to maturity

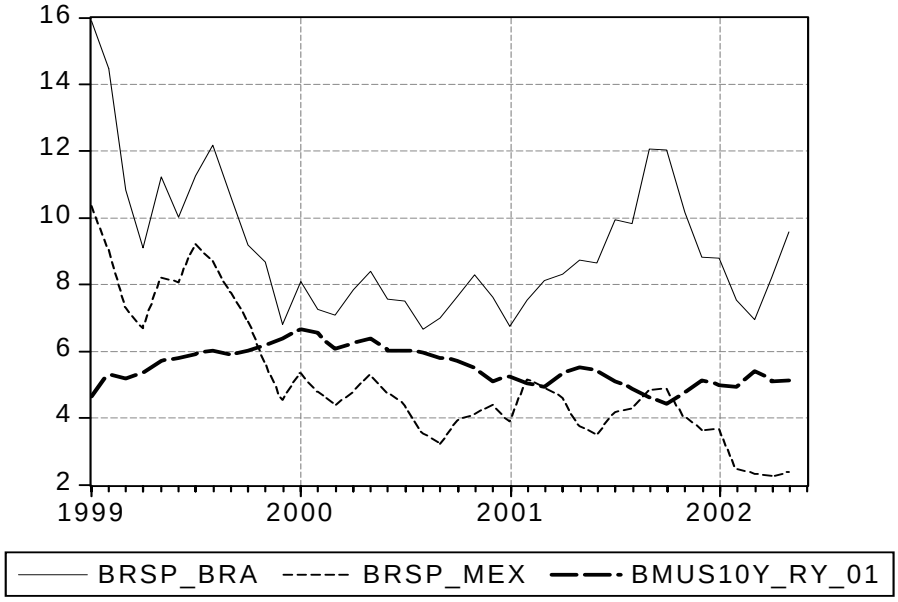


Figure 3: The Real $-US Dollar Exchange rate, 12-month ahead inflation expectations and simulated inflation expectations and SELIC rates

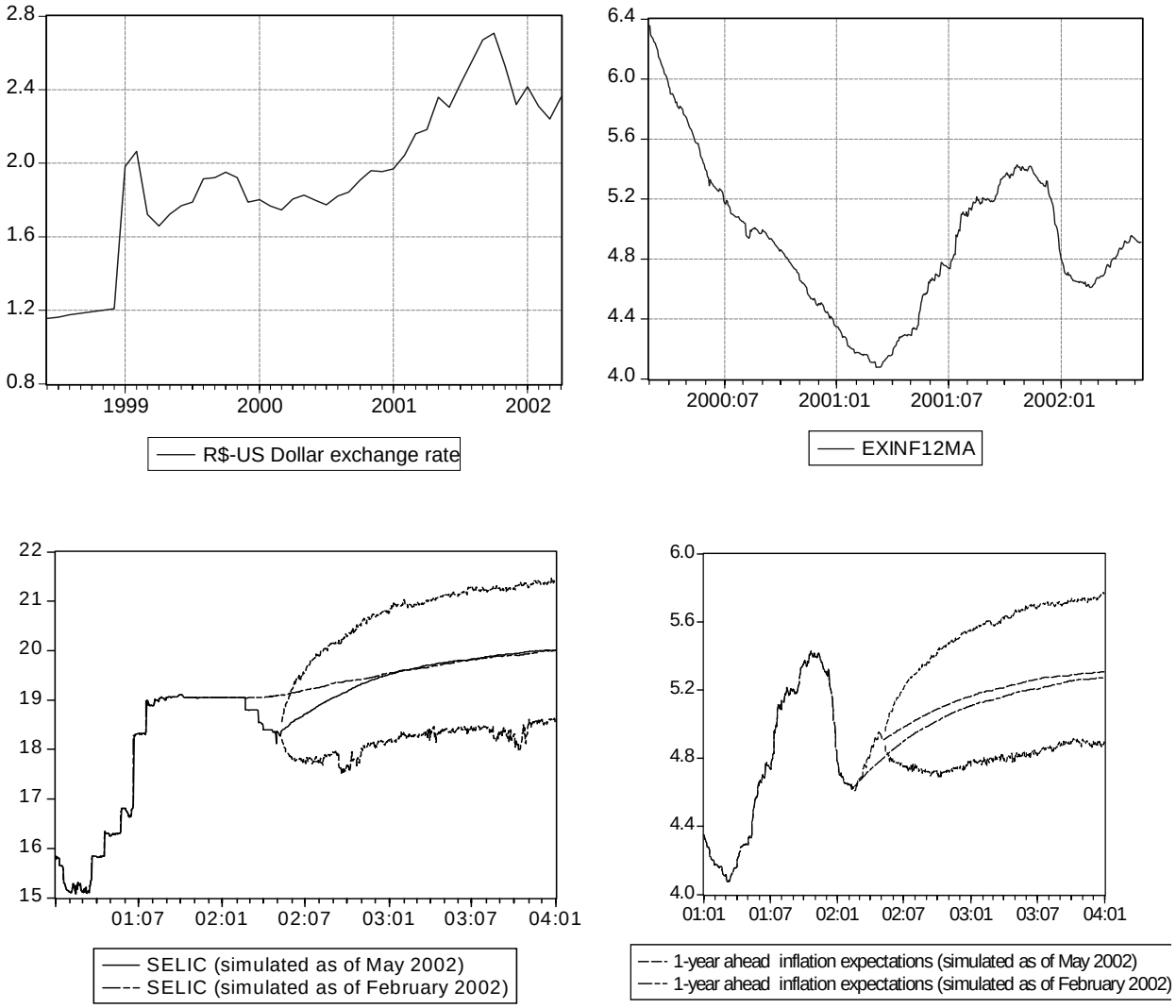
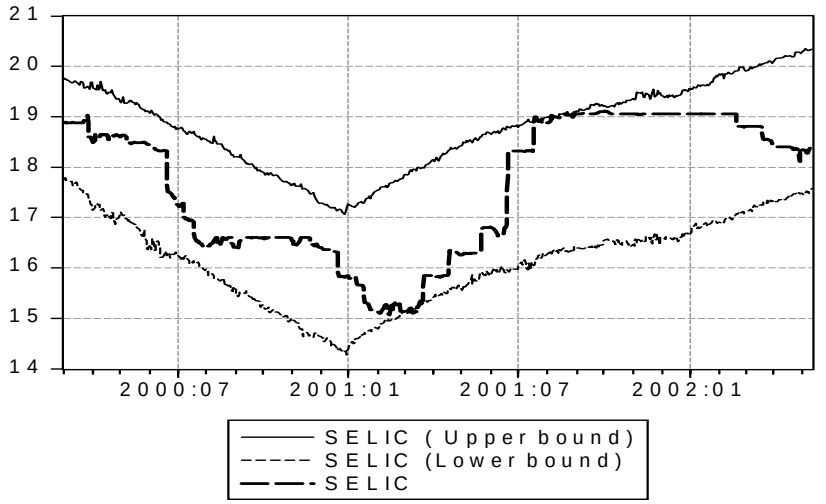


Figure 4: Actual and simulated policy rates and one-year ahead inflation rates since January 2000



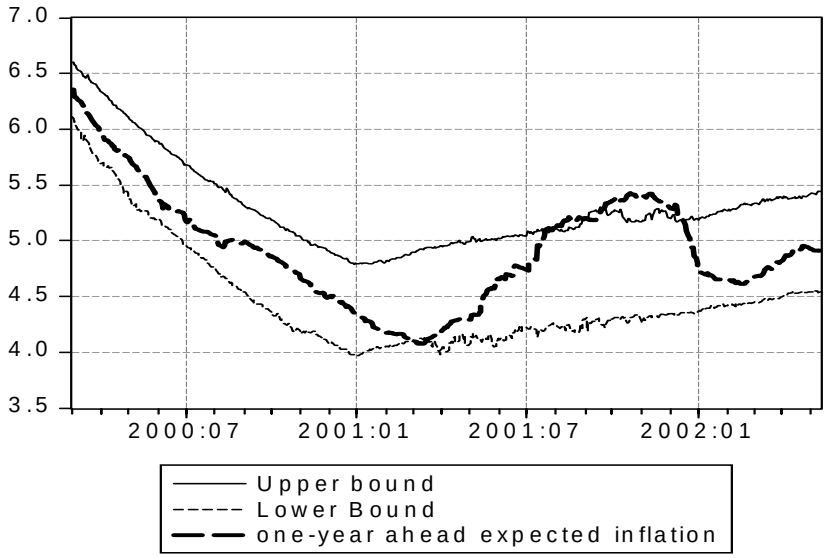


Figure 5: Actual and simulated 6, 12, 18 and 24-month swap rates

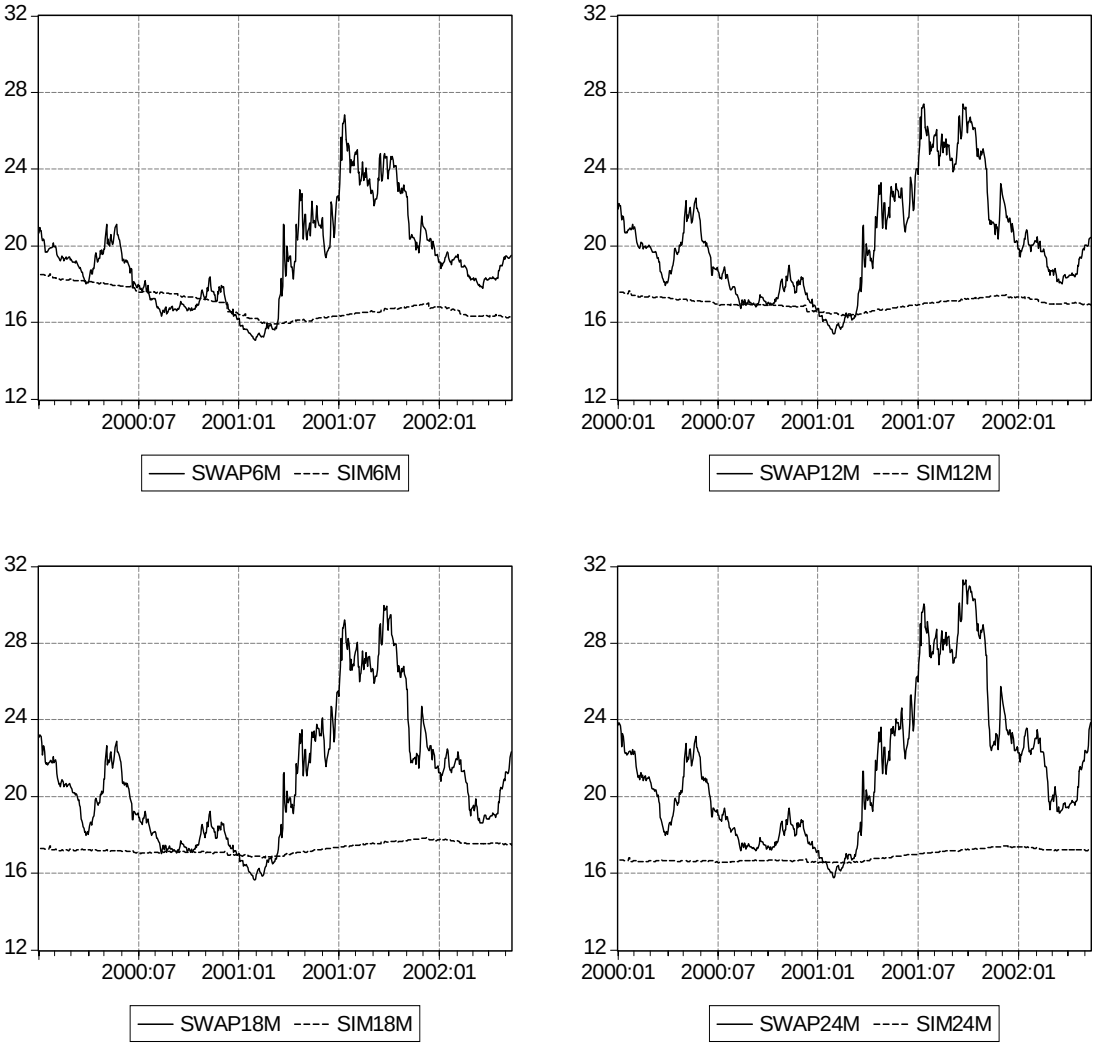


Figure 6: Measures of term premia: Brady Bonds spread and 12, 18, and 24-month premia

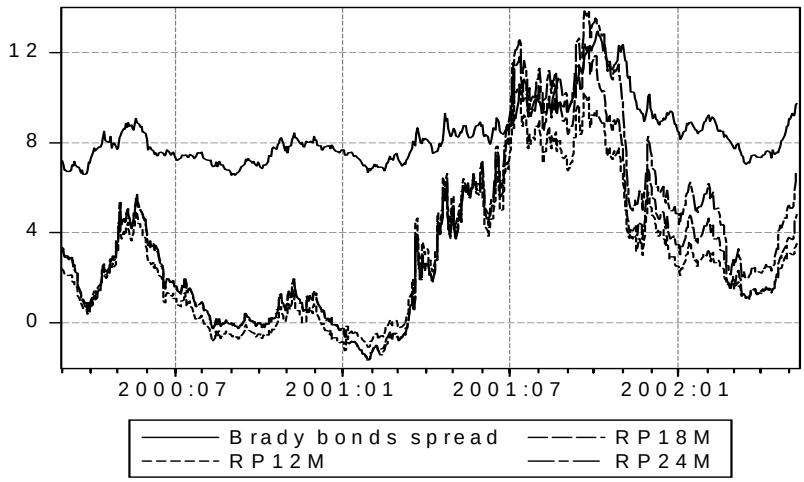


Figure 7: 12-month swap rates (SWAP12M), simulated 12-month rates (SIM12M), with upper (SIM12H) and lower (SIM12L) limits of their 95 per cent confidence interval

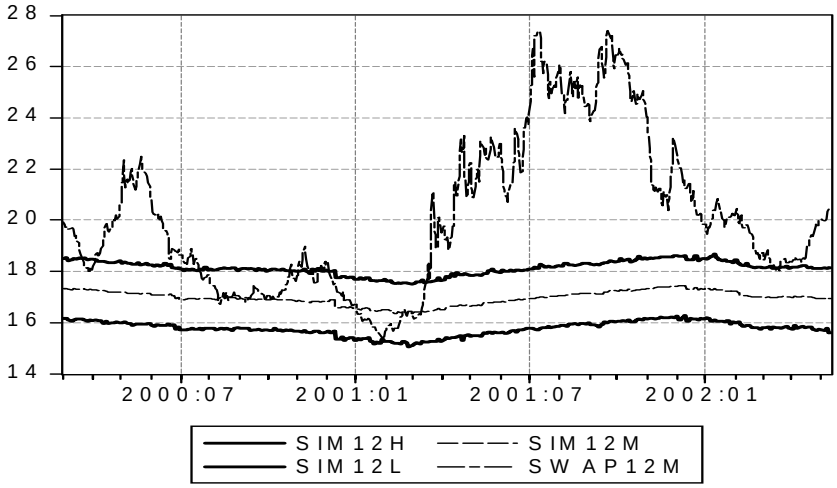
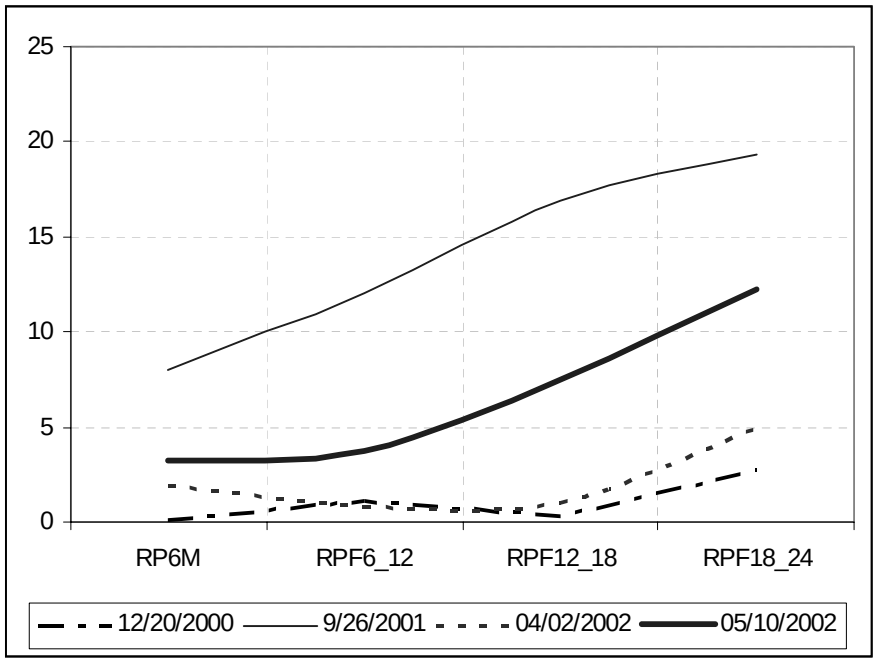


Figure 8: The term structure of the Brazilian country-risk premium



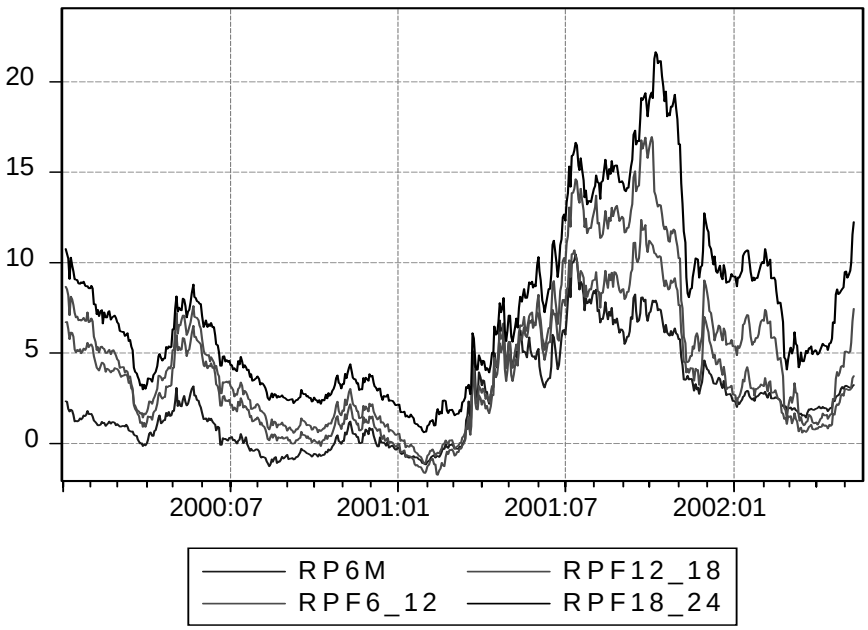


Figure9: Argentina and Brazil

Primary Balances and Debt Ratios in Argentina and Brazil
(Argentina, solid line; Brazil, dashed line)

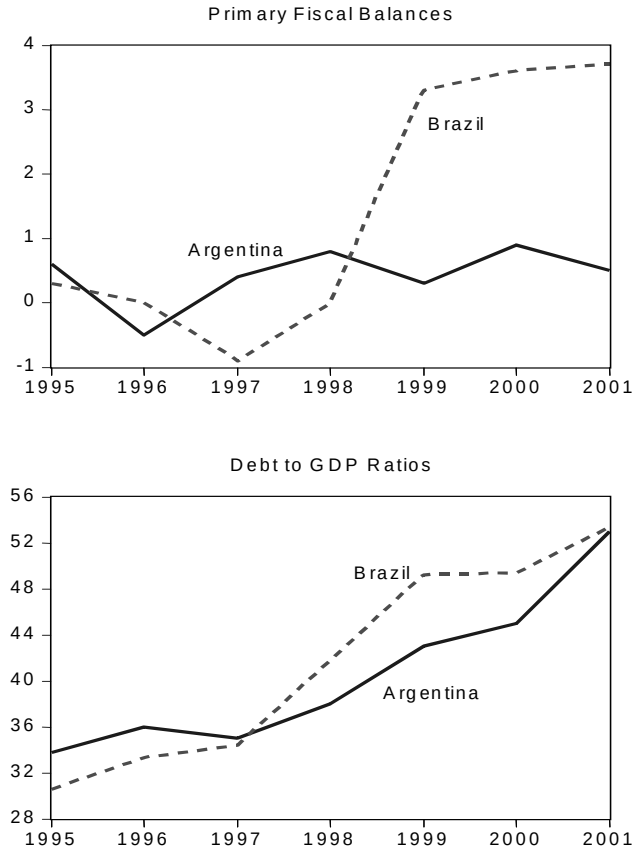
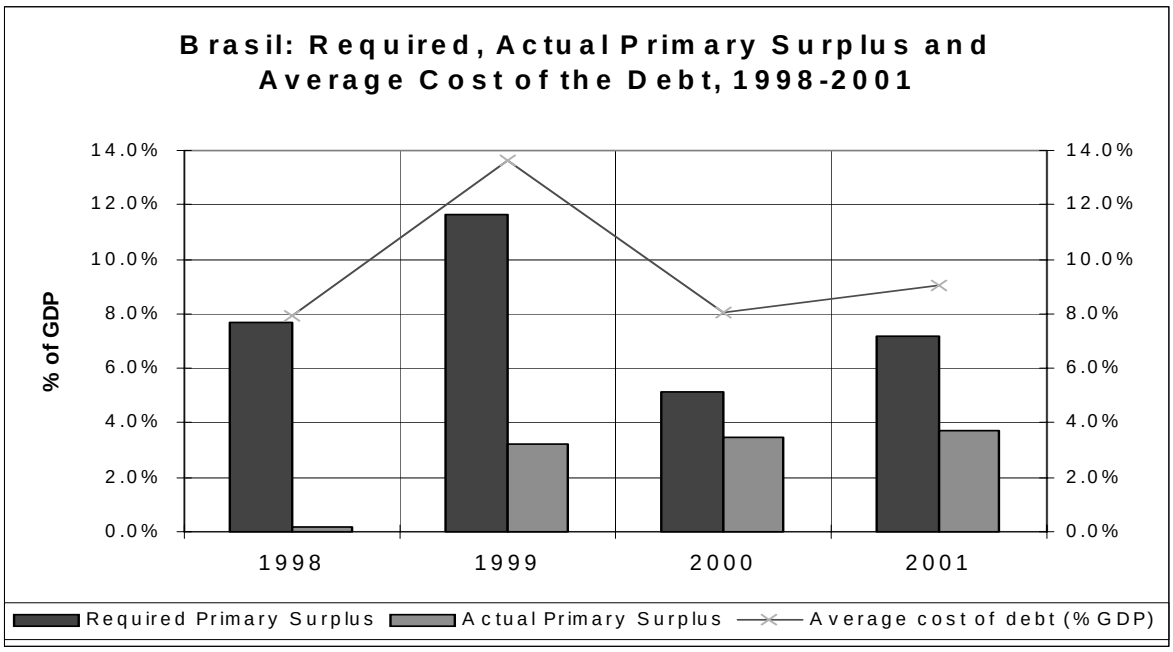


Figure 10: Brazil and Italy



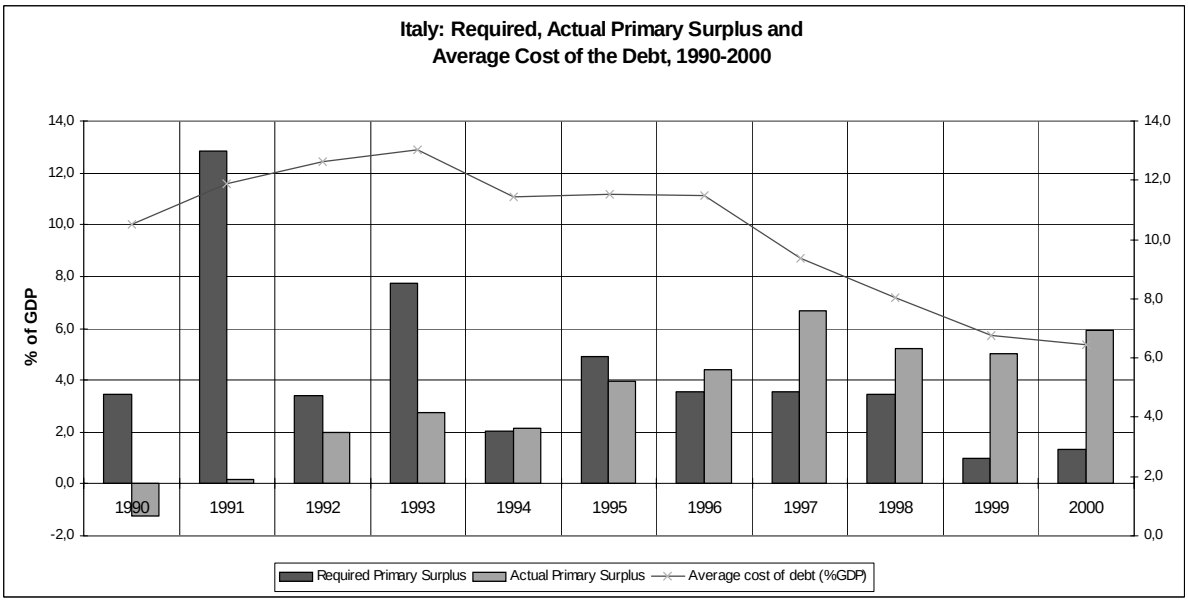


Figure 10 Duration and residual life of Italian debt

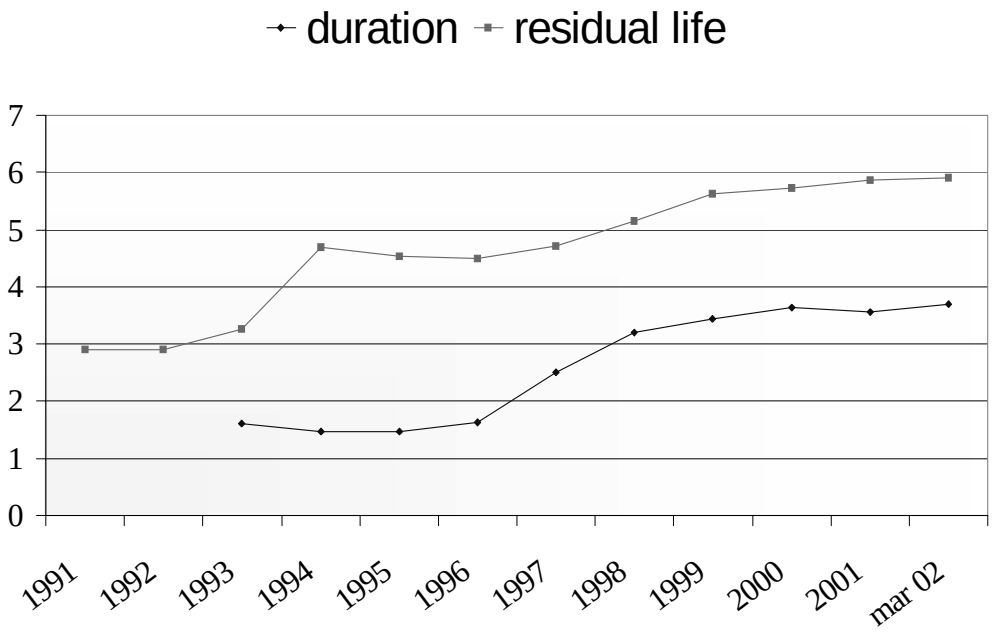


Figure 11: Government's exposure as the duration of the debt lengthens